REPORT

FROM

THE SECRETARY OF WAR,

In compliance with a resolution of the Senate, relative to the employment of the Topographical Engineers.

June 24, 1836.

Read, and ordered to be printed.

War Department, *June* 23, 1836.

Sir: I have the honor to transmit a report of the officer at the head of the Topographical bureau, which has been prepared in compliance with the resolution of the Senate of the 18th instant, inquiring "in what manner the topographical engineers, and the officers serving under them, are now employed.

Very respectfully, your most obedient servant,

LEWIS CASS.

Hon. M. Van Buren, *President of the Senate.*

Topographical Bureau,

Washington, June 21, 1836.

Sir: In obedience to a resolution of the Senate of the 18th instant, I have the honor to submit to you the enclosed tabular statements. As the civil engineers are officers of this bureau, a statement of their present employ is also submitted.

Presuming the resolution to have for its object the obtaining of a knowledge of the duties of the officers of the Topographical bureau, which cannot well be exhibited under the words "now employed," as the present arrangement of the whole is considered subject to any modifications which the laws or resolutions of the present Congress may make necessary, I have the honor to submit a copy of the annual report of the 2d of November last. This report also explains the rules under which the various surveys are made.

There are, generally, about thirty officers of the artillery and infantry on topographical duty, but the Indian disturbances have occasioned all but the few named to be ordered to their regiments, and I am informed that it is in contemplation to order the whole of those that remain to their proper line duties.

I am, very respectfully, sir,

Your obedient servant,

J. J. ABERT, *Lt. Col. Top. Eng.*

Lewis Cass, *Secretary of War.*

[Gales & Seaton, print.]

A.

STATEMENT showing the manner in which the corps of Topographical Engineers are now employed.

Names of officers and their assistantants.	Nature of their duties.	Remarks.
Lieut. Col. J. J. Abert, topographical engineer. Assistant, Lieut. W. Hood, 4th infantry.	In charge of the Topographical Bureau, and exercising general supervision of the corps of topographical and civil engineers.	
Lieut. Col. J. Kearney, topographical engineer. Assistant, Lieut. C. Graham, 3d artillery.	Upon the survey and estimate of a route for a railroad on the Eastern Shore of Maryland.	This survey was undertaken under a resolution of the Legislature of Maryland, asking for the services of a Government engineer for that purpose.
Lieut. Col. S. H. Long, topographical engineer. Assistants, Lieuts. J. G. Simmons, 7th infantry, and J. F. Cooper, 2d infantry.	Surveying a route for a railroad from Belfast, (Maine) to Quebec, (Canada.)	Under a resolution of the Legislature of Maine, asking for the aid of United States engineers.
	Surveying a route for a railroad from Merrimac river to Connecticut river.	Upon an application from an incorporated company.
Major H. Bache, topographical engineer. Assistant, Lieut. R. S. Dix, 7th infantry.	Preparing report and drawing of the survey of Georgetown harbor, South Carolina.	This survey was made with a view to the erection of fortifications for the defence of said harbor.
Major W. G. McNeill, topographical engineer -	Superintending the construction of the Long Island railroad.	Upon an application from an incorporated company, but subject to other duties as soon as required.
Major J. D. Graham, topographical engineer -	Superintending the opening of a road from the northern boundary of Florida, by Marianna, to Appalachicola.	Under the act of Congress passed 30th June, 1834.
	Surveying a route for a railroad between Pensacola, (Florida,) and Columbus, (Ga.)	Under an application from an incorporated company.
Captain W. Turnbull, topographical engineer. Assistant, Lieut. J. E. Johnston, 4th artillery.	Superintending the construction of the Potomac aqueduct.	Upon an application from an incorporated company, in aid of which Congress have appropriated funds.
Captain W. H. Swift, topographical engineer -	On the survey of the coast - - -	Assistant to Mr. Hassler—the duty being by virtue of a law of the United States.
Captain W. G. Williams, topographical engineer. Assistants, Lieuts. T. Drayton, 6th infantry, and J. G. Reed, 7th infantry.	Surveying a route for a railroad from Charleston to Cincinnati.	Upon an application from a Senator from South Carolina on behalf of the State.

Captain A. Canfield, topographical engineer -	Waiting orders - - - - -	Just returned from duties in Florida, as a topographical engineer, with the army.
Lieut. J. M. Berrien, 5th infantry. Assistants, Lieut. E. Rose, 3d artillery, and A. J. Center, 5th infantry.	Surveying the shores of the Western Lakes, and certain harbors and roads in Michigan.	The survey of the Lake Shore is for military and commercial purposes, under the order of the United States. The harbors and roads are on the application and at the expense of incorporated companies, but also aid to develope the military and commercial resources of the Territory.

B.

STATEMENT showing the manner in which the corps of Civil Engineers, employed under the act of the 30th April, 1824, are now employed.

Names of civil engineers.	Nature of their duties.	Remarks.
W. B. Guion, civil engineer - - -	Waiting orders at Washington - - -	To be put on duty as soon as the appropriations are passed, the present appropriation being nearly exhausted.
G. W. Hughes, civil engineer, and C. N. Hagner, assistant civil engineer - -	Employed on the survey, plan, and estimate of the route for a canal from Washington to Annapolis, Maryland.	Under a resolution of the Legislature of Maryland, asking for the services of a Government engineer to make the survey.
H. Stansbury, assistant civil engineer - -	Waiting orders at Washington - - -	The remark in Mr. Guion's case applies to this.
W. R. Palmer - - - - -	Assistant to Major J. D. Graham, in Florida.	
G. W. Featherstonhaugh - - - -	Assistant to Captain Williams, in South Carolina.	
J. D. Webster - - - - -	Waiting orders at Washington.	

Topographical Bureau,
Washington, June 21, 1836.

JANUARY 12, 1836.

Mr. R. M. JOHNSON, from the Committee on Military Affairs, made the following report:

The Committee on Military Affairs, to which was referred the reorganization of the corps of topographical engineers, report:

That they refer to their report of the last session, and to the report from the Topographical bureau of this session, as a part of the present report, and they also report a bill.

DECEMBER 16, 1834.

The Committee on Military Affairs having duly considered that part of the President's message, referred to that committee, which relates to the corps of topographical engineers, beg leave to report:

That the subject of reorganizing and enlarging this corps has been recommended to the consideration of Congress by four different Executives, and that on several occasions bills to effect these objects have been reported by various Committees on Military Affairs.

There is no part of the army as defective in its organization as this, and subject, in consequence, to as great inconveniences in the execution of its duties. It consists of six field officers and four captains, to which are generally attached as many as thirty lieutenants of artillery and infantry.

These lieutenants are so attached by temporary details, and the effect of this system is to take from their proper duties those who were intended for the line, and to force upon another and highly interesting branch of service, inexperienced and consequently incompetent assistants. These assistants, after a short tour of duty, are again called back to the line, and others entirely new to the duty are assigned to their places. Such a course has, as it could not fail to do, led to great delays in the execution of the duties of the corps, has exposed it to the errors inevitable from the employ of inexperienced assistants, has procured but partial returns in comparison with either the numbers or the expense of the system, and has kept this corps, comparatively speaking, stationary in its scientific operations, and continually in the execution of the most simple details.

The officers temporarily attached have the requisite theoretic information, from their education at the Military Academy, but the short period of their service with the corps of topographical engineers does not admit of a development of that theory into practice, nor of their attempting the higher walks of their profession. After returning to their duties in the line, they soon forget the little practical knowledge they acquired during the short period they were with the corps, and, while there, must also, from the want of its use, have forgotten much of the knowledge of their proper line duties. It is a system, therefore, productive only of injury to the officer, to every branch of service, and consequently to the Government, which is interested in all.

It is also a system at variance with true principles of economy, as its effect is to product the fewest and least valuable results, at the greatest expense.

The duties of such a corps are essentially military and scientific: it is therefore necessary that its members should have both military and scientific knowledge, as both have to be called into action in the exercise of their proper functions.

In Europe, where the military avocation is so much more extensive than in our country, the duties of a corps of topographical engineers are rarely extended to occupations purely civil. These last are committed to a distinct body of officers, called the corps of ponts and chaussee. But the more limited military operations of our country do not yet render such a division of labor necessary, and the duties of two such corps can be well executed by one. But as the military functions of the corps are by us the most required, so is it, therefore, absolutely necessary that its members should be military as will as scientific. The two qualifications are essential to their proper duties, the latter only in operations purely civil. But, in the execution of the latter, if the officer also possesses military knowledge, it gives a double value to the purely civil duty upon which he may be engaged, by the military views and reports which should always be required of him.

Happily for our country, we possess, at present, in abundance, the finest materials for such a corps in the graduates from the Military Academy who now pervade our army so extensively, whose educati n, both military and scientific, furnishes all the requisite qualifications, and who, added to the officers now forming that corps, would place at once at the command of the Executive all that the wants of both the Government and the country have so long and so repeatedly called for.

The committee are also of opinion that these desirable views may be fulfilled, and a suitable organization effected, without any serious increase of expense. But even this additional expense, trifling as it really is, will not be encountered, until, in the judgment of the President, the promotions to the full organization proposed may be found expedient. The plan is to furnish the additional numbers required by the corps, by permanent transfers and appointments from the army, and for the army to be proportionally reduced. Such a plan would relieve the corps from the present pernicious system of temporary details, and would not be to the prejudice of the army, as the army now spares officers for these duties permanently.

The present details are temporary in reference to individuals only, but permanent in reference to numbers.

Now, as the corps has generally had from twenty-five to thirty lieutenants of artillery and infantry attached to it by detail, the pay of these officers is really chargeable upon that corps, although it does not appear so in the estimates, being there merged in the pay of the artillery and infantry. If permanently transferred, they would still draw their pay, but it would appear under the head of an estimate for the corps of topographical engineers, and the estimates of the artillery and infantry would be porportionally reduced.

In effecting the transfers, however, certain modifications ought to be made in the rank of the corps, essential to its well being. These modifications would be to give to it a full colonel and six additional captains.

It has now six field officers and four captains. One of these six draws the pay of a lieutenant colonel, five that of major. The modifications would, therefore, add only to the annual expense the difference between the pay of one major and one colonel, and the difference between the pay of six lieutenants and six captains.

On examining into the law in relation to the topographical engineers as now existing, the committee find a singular inconsistency in the pay of its officers. All of the field officers receive cavalry pay, the captains only the pay of the infantry. It is presumed to have originated in mistake. All have to be mounted in the execution of their duties: all should, therefore, receive the pay of mounted troops. An arrangement of this kind becomes also necessary in another point of view. Unless there is some such provision in the law, those officers of the corps who now receive dragoon pay, would, on a reorganization, suffer a reduction, which we presume to be the desire of no one.

To carry these views into effect, the committee beg leave to submit the accompanying bill.

TOPOGRAPHICAL BUREAU,
Washington, November 2, 1835.

Hon. LEWIS CASS, *Secretary of War*:

SIR: In obedience to your instructions of the 4th of September last, I have the honor to submit to you a statement, marked A, exhibiting the amount drawn from the Treasury Department and remitted to the disbursing officers under this bureau, from the 1st of October, 1834, to the 31st of September, 1835, inclusive, and the amount of accounts rendered.

The topographical and civil engineers have been employed upon, and the funds appropriated for surveys for the year 1835 have been applied to, the following objects:

1. An examination of the route for a railroad from Memphis, in Tennessee, to the Atlantic ocean.

2. A report and estimate of the cost of the construction of the Portage summit of the Ohio canal, that is, the canal from Pittsburg to Lake Erie.

3. Survey with a view to the improvement of the Cumberland river from Nashville, Tennessee, to the head of navigation in Kentucky.

4. The report of the geological investigations made of the public lands, and of the Territory of Arkansas.

5. A survey of the harbor of St. Joseph's, in the Territory of Michigan.

6. A survey of the harbor at the mouth of Trail creek.

These surveys and reports, from 1 to 6 inclusive, have been completed since the last annual report, and were reported to Congress during its last session.

7. A survey of the Delaware river from Newcastle to Port Penn, and a survey of Pea-patch island.

These surveys embrace an exposition of all the facts necessary in the digesting of a system of the defences of that pass in the river, as well as all those necessary to its navigation. The duty is completed and the maps delivered to the bureau.

8. A survey of the Brandywine shoal. The object of this survey is to determine the best position on the shoal for the construction of a light-

house. It is a highly important point in the navigation of the Delaware bay, but its exposed situation, and the composition of the shoal, make it one also of extreme difficulty in the establishing of a foundation which will endure and sustain the superstructure for the light.

The appropriation for this object was made in June, 1834, and in the following words:

"For rebuilding the light-house on Brandywine shoals, in the bay of Delaware, thirty thousand dollars: *Provided, however*, That, before the commencement of the work, a resurvey, plan, and estimate shall be made, and that then it shall be in the discretion of the proper department to enter upon the rebuilding of the said light-house, or to report such survey, plan, and estimate to Congress as shall be considered best for the public interests."

The survey was commenced as soon as the necessary arrangements could be made, and it was ascertained in a short time that the appropriation was entirely inadequate to the object, which, as a measure preliminary to the building of the light-house, required that an artificial foundation should be established upon a sandy shoal, in the mouth of a wide bay, and exposed to the violence of the waves of the Atlantic.

Under these circumstances, the alternative presented by the law was adopted, and the survey, plan, and estimate, were presented to Congress during its last session.

As it was not acted upon, additional investigations have been since made, and their result is the foundation of an item in the estimate from this office for the "rebuilding of the light-house on the Brandywine shoal."

The report, estimate, and plan, in all their details, are daily expected from the engineer who had this survey in charge, which, as soon as received, will be laid before you.

The amount appropriated in the act of June 30, 1834, was 30,000 dollars, of which 1,550 dollars have been drawn out of the Treasury for the necessary preliminary surveys. The total amount of the estimate of the engineer is $123,985 93, leaving for the object a deficiency of $95,535 93, which amount constitutes an item in the estimates of this bureau.

9. In the drawings and reports of various parts of canal routes across the States of Maine, New Hampshire, and Vermont, in order to complete a series of surveys for the same objects which had been partially attended to some years since. All the field work of these surveys is completed; the drawing and reports only have to be made: these, it is expected, will be delivered to the bureau during the ensuing winter.

The delay which this work has experienced has been an unavoidable result, from the small number of the corps, which forced the bureau to extend the attention of the officers superintending this to other duty.

10. The drawings and reports of the military defences of parts of the coasts of North and South Carolina. The system of army details, which removes our assistants before the completion of the particular duty upon which they have been engaged, together with a diversion of the attention of the superintending officers to other surveys, has occasioned the delays which these works have experienced. There is, however, every reason to believe that they will be completed during the ensuing winter.

11. A survey of a canal route from Cape Fear river, through the Waccamaw lake, to the Waccamaw river, North Carolina. The returns of this are daily expected.

12. An examination of the construction of the canal around the Muscle shoals of the Tennessee river.

13. An examination of the route for a railroad from Portland, in the State of Maine, to Quebec, in Canada.

14. The survey of a route for a railroad from the Connecticut river, to intersect the Concord railroad, in New Hampshire.

15. The survey of a route for a railroad from Boston, in Massachusetts, to Whitehall, in New York.

16. A survey of the harbor of East Thomaston, in Maine.

No. 16 is completed, and the results are expected at the bureau early during the ensuing winter. Numbers 13, 14, and 15, are not in as great a state of forwardness. The extensive views embraced by these three, and the lateness of the season when the attention of the officer who has them in charge was called to 14 and 15, render it highly probable that no definite report will be made by him until during the course of the next year.

17. A survey of the Christiana river from Wilmington to the Delaware, with a view to improve the entrance of the Christiana. This is completed.

18. A survey of Provincetown harbor and its vicinity. The survey of this position, so important in the military defence of the coast east of Cape Cod, and as a point of shelter for our commerce from a pursuing enemy, or from storms, is now completed. All the field work is done, and the drawings and reports will also be, during the present year.

19. The survey of a route for a ship canal around the falls of Niagara, effecting a junction with the two lakes, Erie and Ontario. The field work of this duty is completed; the drawings and reports are in progress, and will be delivered to the bureau during the ensuing winter.

20. A survey of the channel between the North and South Hero islands, on Lake Champlain. This duty is also so far completed that the drawings and reports will be delivered to the bureau during the present year.

21. A survey of a route for a road from the Alabama line, by Marianna, to the town of Appalachicola, in Florida. This duty was completed, but, before entering upon the opening of the road, as required by the law, it was thought advisable to examine a different route which would apparently much shorten the distance. This examination is now making.

22. A resurvey of the route of the national road between Springfield, Ohio, and Richmond, Indiana; also from Springfield, by way of Dayton and Eaton, to Richmond. This duty has been completed, and the drawings and report delivered to the bureau. These last have also, in conformity with the law, been submitted to the President, who has affixed his approbation to the location of the direct route.

23. A survey of the Maumee river, from its mouth to Maumee city, completed, and the drawings received.

24. A survey of the route for a railroad from Detroit to Pontiac.

25. Also the route of a railroad from Detroit to the St. Joseph's river.

These surveys have been completed, and the returns duly made.

26. A survey of the route of a road from Chicago to Fort Howard, on Green bay.

27. A survey of the mouth of Gallean river.

28. A survey of the mouth of Black river.

29. A survey of the mouth of Milwalkee river.

These four (26, 27, 28, and 29) are now in progress, and it is expected will be completed this fall and the ensuing winter.

30. A survey of a railroad from Memphis, Tennessee, to such point on the lines of the States of Virginia and Tennessee, as may be best adapted, in the opinion of the engineer, to facilitate the continuation of the road to the Chesapeake. The survey is now in progress.

31. A survey of a route for a road from the Maumee river, through the northern counties of Indiana, to or near the rapids of the Illinois river, and thence to the Mississippi river, at some point between Rock island and Quincy. The field work of this survey is completed, and the drawings and reports are expected to be delivered to the bureau during the course of the present year.

32. The survey of the following routes for roads in Indiana:

Lawrenceburg and Indianapolis railroad.

Madison and Lafayette railroad.

Evansville and Terre Haute railroad.

Columbus and Jeffersonville railroad.

New Albany and Vincennes turnpike-road.

New Albany and Crawfordsville turnpike-road.

33. In superintending the construction of the aqueduct over the Potomac at Georgetown. This may truly be considered one of the most interesting and one of the most difficult of civil constructions ever attempted in our country. The object of the work is to conduct the Chesapeake and Ohio canal over the river Potomac, at the upper end of Georgetown, and thereby to furnish to its trade a termination in the fine harbor of deep water at Alexandria.

The length of the aqueduct is 1,700 feet, (including the causeways,) sustained by two abutments and six piers, at a height of 29 feet above the common high tides of the river. These abutments and piers are all to rest upon the natural rock foundation which is found throughout the length of the aqueduct, at a depth nearly uniform of 30 feet below common high water, making the total height of each pier 59 feet.

The successful establishment of a foundation at such a depth, in water and mud, is among the most difficult problems in the practice of the engineer, and the experience of the world has furnished so few instances of similar attempts, that he is comparatively without those guides which are in other instances so easily obtained.

But the persevering efforts of science and mechanical skill supplied the deficiency of information from precedents, and overcoming all obstacles, triumphed in the successful establishment and completion of one pier during the course of the last season, and in a successful issue to the greatest difficulties in the establishment of a second, and of one of the abutments.

This work is the result of the enterprise of an incorporated company; but as the United States furnished a proportion of the funds for its aid, the company considered it advisable, and applied to have its expenditure placed under the direction of an officer of the corps of topographical engineers, that any desired investigation in reference to the faithful and judicious application of the means allowed by the United States could be made independently of their control, and that they might also, in so difficult and rather unprecedented an undertaking, avail themselves of the presumed science of its officers.

It affords me much satisfaction to add, that a frequent inspection, as well of the work as of the expenditures, has resulted in a conviction of the great skill and judgment of the engineer, and of the faithful application of the funds. The books exhibit the most minute detail of expenditure for every object; and his mechanical arrangements have been justly admired by all who have visited the work. The engineer is prepared, whenever it shall be called for, to present the most satisfactory statements, descriptions, reports, and drawings, in reference to the whole.

34. In the survey of a railroad from Pensacola, in Florida, to Columbus, Georgia. Although Pensacola is one of the finest harbors on the Gulf of Mexico, and, in fact, of the United States; and although it is also, at present, an established navy yard and navy depot, yet, as the land in its vicinity is extremely poor, and there is no river leading from its harbor to the interior, its commercial advantages are but partially felt, and the population necessary to its defence exposed to hazardous and difficult, or tedious and dilatory methods of access. The remedy for these evils is in improving all means of communicating with the richer soil and denser population of the interior, and the road now being surveyed will eminently accomplish these objects. It will open to the products of the interior a cheap and rapid means of access to an uncommonly fine harbor, and will enable that harbor to command for its defence the strength of the interior in the shortest possible time. It possesses, therefore, a highly national aspect, deserving of the patronage which has been extended towards it by the General Government, in permitting its officers to superintend the work.

35. In a continuation of the mineralogical and geological investigations of the public lands, the Territories, and the Indian country. The highly interesting results from the geological investigations of the last year, under the same officer who has now those of this year in charge, are the best earnest of the manner in which these will be performed.

His instructions were, that, "it being desirable to have some knowledge of the mineral structure of the Coteau de Prairie, an elevated ridge which separates the Missouri from the St. Peter's, a tributary of the Mississippi, you are directed to proceed to that vicinity, and to make such investigations as the season and the nature of your opportunities will admit. It is desirable, also, that you should take Green Bay in your way, with a view to the examination of the mineral structure in the vicinity of the Ouisconsin river."

Early history had mentioned the "Coteau de Prairie" as a locality rich in its deposite of copper in its various forms. Records which are presumed to be deserving of confidence, state that many tons of this mineral had been taken at an early period of our history to France, and there smelted to advantage. There is no doubt that it exists in that region, but in what quantities, and in what particular places, have yet to be ascertained.

From the known intelligence, great zeal, and untiring perseverance of Mr. Featherstonhaugh, no doubt is entertained that all that can be will be done in accomplishing the discovery; but he has to contend with the difficulties of an unknown and wilderness country, and in a climate affected early in the season with the inclement weather of winter. Should

his report, therefore, not be as much in detail as is desirable, (of which there is some reason to fear,) there is no doubt that every accessible general indication will be ascertained, sufficient to form the most encouraging basis, and the best justification for future and more detailed investigations.

The great interest which is felt by the country in reference to this particular duty, exhibited by an unparalleled demand for the report of the proceedings of last year, is no equivocal proof of the value which is placed upon it, and the advantages which are anticipated to result from it. Such investigations are beyond the resources of individuals; and the States limit those which they authorize to the extent of their territories. If the United States does not, therefore, complete the chain of knowledge by a continuation of its efforts in reference to the public lands and the Territories, an extensive region, rich with the most valuable ores, will continue to remain unknown. Under these impressions I have hazarded a small item in the estimate from this office, to enable it the more satisfactorily to complete a duty which has been so fortunately begun.

It may probably be observed, that in the foregoing statement of surveys, there are many enumerated which were not ordered by a resolution of either House of Congress, or by any law.

The rules which have been prescribed for this office in these matters, are as follows: That, 1st, surveys ordered by law, and for which there are generally specific appropriations, should be attended to.

2d. Surveys ordered by resolutions of Congress. The expenses of these are paid out of the annual appropriation for surveys, including the pay of the civil engineers, which is taken out of the same appropriation.

3d. Surveys of a national or highly interesting commercial character, applied for by States or incorporated companies. In these cases, such officers as can be spared, (with their instruments,) are allowed to be assigned. All other expenses, including those for additional engineers, or additional instruments, are supplied by the parties interested in the survey, the United States being subjected to no charge on these accounts; or, in other words, confining the aid from the United States to the mere loan of such engineers, and of such instruments as can be conveniently spared.

In the execution of the foregoing duties, the whole force of this bureau, in military as well as civil engineers, has been employed. Its military engineers consist of the corps of topographical engineers and such lieutenants of the army as are detailed for its duties; its civil engineers, of those authorized to be employed under the authority of the law of the 30th April, 1824.

The first embraces, of the corps of topographical engineers,	10 officers.
Of lieutenants now detailed for this duty from the army,	26 do.
The second, being citizens without military rank, employed under the act of the 30th April, 1824, - - -	13
Making the whole force of engineers employed under this bureau, equal to - - - - - -	49

The evils of these military details arise from—

1st. The shortness of the time in which an officer, being placed on the duty, has to acquire that practical knowledge in the use of instruments, and the habit of applying his scientific knowledge to results in practice, without which he can be of no value.

2d. The apathy which oppresses a temporary detail, from the consciousness that if he labors, it is to acquire that which, as soon as it is obtained, he will, in all probability, be removed from the only sphere of action in which it can be applied.

3d. When the temporary detail is endeavoring partially to acquire a knowledge of the duties of the corps to which he is attached, he must, from the very nature of things, lose, by its disuse, much of the knowledge of his proper arm of service, and when he returns to it, be consequently a less valuable officer than when he left.

4th. The corps is, under this system, continually exposed, in the execution of its duties, to those consequences which must flow from the services of unqualified and consequently incompetent assistants, and is forced from this cause to increase its demands upon the army, that it may compensate partially by numbers for deficiencies in experience. These demands, if complied with, but increase the general evil before alluded to; they cannot be complied with but partially, as the line has duties for which these subordinates were intended, and which it would not do to neglect. We are placed thereby in a continued series of unpleasant bickerings with the line. The corps endeavors to retain its experienced assistants as long as possible, because they are essential to the well-doing of its duties. The line regrets these details, however temporary; it seeks to reduce them to short periodical tours, and is continually endeavoring to get back the older assistants. It is a system, therefore, in which the permanent interests of the line and of the corps are diametically opposed, and which, as might well be supposed, by the occasional success of either, has left one or the other exposed to the reproach of negligence or favoritism.

There is no one more strongly impressed than myself with the efforts which the line now makes in order to aid us in our duties, and that it cannot do more without a sacrifice of its own; but, at the same time, I must acknowledge that, after many years of experience, I am satisfied that the duties of the topographical engineers can only be carried to that extent of perfection and intelligence which the country has a right to expect, by a system which shall permanently attach its assistants to the corps.

The effect of these details from the army for the duties of the corps may be expressed in a few words. If temporary and periodical, it is a sacrifice of the duties of the corps; if permanent, while they yet retain their rank and its privileges in the line, it is, to the extent of the number detailed, a sacrifice of the interests and duties of the line.

The civil engineers employed under the act of April 30, 1824, are officers without military commissions or military rank. The law recognises no distinction of grade or of title between them, although the custom of service has divided them into the two classes of civil engineers and assistant civil engineers. The rules and articles of war, and the army regulations, cannot be extended over them. There is, therefore,

an absence of legal authority in relation to their control, and also of defined right in relation to their privileges, from which it will be seen that no subordination or authority can well be established in such a service. No serious evils have yet resulted from it, owing, however, more to the correct moral bearing of the gentlemen who hold these appointments, than to any well-defined power over them. Among the greatest inconveniences of this arrangement, is the difficulty of associating the two kinds of engineers on the same duty. The military engineer is unwilling to be placed under the civil, and probably cannot be by law, or in a way that would involve any legal responsibility. The civil engineer is equally unwilling to be viewed as subject only to be commanded, without the hope of ever enjoying the right of commanding in turn. It is a moral prostration of his branch of service to another, without the prospect of ever being relieved from it, and adapted to engender painful and unpleasant feelings, as well as being in itself unjust.

Another evil is, that this mixed arrangement of military and civil appointments, is destructive of a proper *esprit de corps*, and of that united emulation which exerts the whole mass of mind to elevate the duties of that branch to which it belongs.

With a service so constituted, and beset with inconveniences so detrimental to its duties, this bureau has been struggling for years, sparing no efforts, however, to do the best which could be done, with the means placed at its disposal.

The means have already been represented generally. I shall now speak of them numerically and economically, with a view of submitting a plan which will, if adopted, remedy all the evils, and without additional cost.

The military engineers consist, 1st, of the corps of topographical engineers, ten in number. Of these, one receives the pay of a lieutenant colonel, five have the pay of majors, and four the pay of captains. The annual compensation of the whole is $14,496.

2d. Of the temporary details from the army. These vary from 25 to 30. There are now 26 on this service. The annual compensation of these is $23,344.

The civil engineers consist of those employed under the act of the 30th of April, 1824. Taking the average of the last three years, their number is 13, and their annual compensation is $16,700.

The entire annual cost of the whole number of officers on topographical duty is therefore $43,540.

In the above statement, it will be perceived that the officers detailed from the army, are included in the sum of the total cost. All these details receive their pay out of the general appropriation for the army, and it does not therefore appear in any estimate for the corps of topographical engineers or for surveys; yet, as this number is always employed on topographical duty, their pay is justly chargeable to that branch of service, and is therefore included in the sum of its annual cost.

The compensation for the civil engineers is taken from the customary annual appropriation for surveys.

From the foregoing, it will therefore be perceived that the present force and rank of officers for topographical duty consists, in its present mixed and complicated organization, of one lieutenant colonel command-

ing, five majors, four captains, twenty-six lieutenants of artillery and infantry, and thirteen civil engineers.

Now, the remedy proposed is to incorporate the whole or part in one regular corps, with the usual grades of military rank, and to subject the whole to the rules and articles of war.

The subject has been treated with much ability by the chairman of the Military Committee, in a report to Congress during the last session. Allow me respectfully to refer you to that report for some views which are not incorporated in this.

But taking the opinion of the distinguished chairman of that committee as the best basis for an improved organization, it results in the recommendation of a corps to consist of one colonel, one lieutenant colonel, four majors, ten captains, ten first lieutenants, ten second lieutenants: in all, thirty-six engineers, of which the total annual cost will be $40,454. Our present imperfect organization gives forty-nine engineers, of which the total annual cost is $43,540; making an annual difference in favor of the organization of $3,086.

The plan submitted presents two questions which require explanation: one referring to the numbers, the other to the cost.

The lesser numbers of the proposed plan are considered capable of doing more duty than the greater numbers of the existing plan; because, 1st, of their better organization; 2d, and of always controlling the experience acquired, which, accumulating to the same individuals, gives that facility and aptness of execution, and readiness in the application of theoretical knowledge, which will enable the lesser numbers in the one case, to do more and better work than the greater numbers in the other. It is, in fact, but an application of the simple axiom, that he who is acquainted with the theory and practice of any profession can do more of it, and better, than any number of those who have not this knowledge.

3d. The number is also based upon the consideration that these were now, and would for many years be, fully adequate to the wants of the General Government for topographical duties.

In reference to the cost, two considerations have been made; one, to be found in the report of the Military Committee of the last session, which reduced the army proportionally to the number transferred from it to the corps. This, of course, would result in a positive reduction of the army estimates, or a transfer of a portion to the estimates of the corps, and would make a positive saving of the amount previously stated; but the army would probably suffer inconvenience from the reduction. It is divided into so many small posts, and extended over so vast a space of country, that it could not feel less the inconveniences of the reduction than it does those of the details. These are already oppressive to its duties. Although the reduction of the army estimate would be thereby a proportional reduction of army expenditure, the reduction would be at the expense of the organization of the army and of its duties, and might, therefore, although a saving, not be considered a true economy.

The other, to leave the army as it is, and organize the corps as it should be. Under this consideration, the total amount of present appropriations absorbed by the proposed organization would be, for the corps of topographical and civil engineers, $31,200: but as the total cost of the pro-

posed corps is stated to be $40,454, it would leave an annual deficiency over our present appropriations of $8,254.

Under either view, the authority to employ civil engineers under the act of the 30th April, 1824, is to be repealed; of course the amount of their annual compensation ceases with the passing of the law for the new organization.

But, as a plan which leaves the army in its present form is, under all circumstances, the better, that for the organization of the corps, which will be presently submitted to you, will be made in accordance to it.

The plan submitted last year, while it authorized a complete organization, embraced a feature of periodical promotions, until the organization should be complete. Such a course is not unfrequent in the extension of scientific corps, when the materials for supplying places have to be formed. But when, as in our circumstances, we have abundant officers, properly educated, experienced in its duties, and who, in fact, are now performing them, such a course cannot be advisable, but on the supposition that a full organization is not now wanted. As we already are obliged to employ more than the organization contemplated, this supposition cannot be well sustained; and believing as I do, the whole number are wanted, I have considered it the better course at once to submit a correct plan to your consideration.

It has been previously observed that the present corps consists of one lieutenant colonel commanding, five majors, four captains; to which are attached twenty-six lieutenants of artillery and infantry, thirteen civil engineers.

The plan proposed adds a colonel to the corps, takes away one major, and from the lieutenants and the civil engineers takes six captains, ten first, and ten second lieutenants.

I have hitherto confined myself to an exposition of the kind of organization which now exists for topographical duties, its defects and inconveniences. Although many of the advantages of the modifications proposed are to be inferred from these, yet it may be well to state a few of the important public services which this corps has to perform, but to which, from its present defective organization, its attention has been applied but imperfectly.

Heretofore its duties have been principally directed to surveys for the defences of the posts and harbors on the Atlantic, including the water approaches to the positions to be fortified.

These surveys generally embrace some extent of coast as well as of inlets, and from the facts which have to be collected, constitute also very valuable, but rather limited, charts for navigation; but the land approaches to these positions remain yet to be surveyed.

Surveys of our harbors and of our rivers on the coast, with views to their improvement, and also to obtain more accurate charts of them than now exist. Although much has been done under this head, yet the greater part of our coast, and particularly from the Delaware, south, has yet to be attended to. These surveys form valuable details to be introduced in the great survey of the coast now being made, and which, with a proper understanding with the principle of that survey, may be introduced into his charts with great facility.

Surveys of the harbors and shores of our Western lakes. It is only

some of the principal harbors of these lakes to which the attention of the corps has yet been directed; those affecting the present lake navigation, and requiring immediate improvement. The connecting links between these harbors, the inlets of a secondary class, and the rivers which empty into them, have hitherto received but little attention. Our imperfect organization and limited numbers were embarrassments to the activity and extent of our operations, which could not be overcome.

Surveys for common roads, railroads, and canals. Although these may be considered as purely of a civil character, yet a finer school of practice than they furnish for the topographical engineer, cannot well be imagined. He obtains on these duties expertness in the use of instruments; the habit of investigating the resources of a country, commercially, morally, and physically; its supplies in provisions, timber, metals, and means of construction; its population, and the best means by which it can be commanded in cases of emergency; its military aspect, hilly, level, or mountainous, and the various roads which intersect the path of his survey. While he is, therefore, apparently engaged on an object ostensibly of mere profit to its undertakers, he is perfecting himself in the practice of his profession, acquiring exact and persevering habits of investigation, improving his *coup d'œil*, and gathering the most valuable information in relation to the capabilities of self-defence, of the locality of the survey, and its ability to aid in the defence of other parts of the country.

Surveys of the inland frontiers of our Atlantic and Western States. Singular as may be the acknowledgment, yet it is nevertheless the fact, that this highly important service has hitherto received but little attention. It embraces not merely a geographical knowledge of the frontiers named, but accurate topographical surveys of the vicinities of all our Western posts; of the best routes for roads of communication between the posts and with the interior, for supplies and assistance. We have hitherto been able to direct but very feeble efforts to these important objects. The fault is not that of this bureau, but of the inadequte means placed at its disposal. Although there is an annual appropriation of twenty-five and sometimes thirty thousand dollars for surveys, yet, as considerably more than half of this is required for the salaries of the civil engineers, it leaves but a small portion for the expenses of surveys. This small portion is generally absorbed in the execution of those surveys directed to be made by resolutions of Congress, and of some parts of our seacost; the latter being a continuation of the surveys directed some years since in reference to a regular digested system of seacoast defence. We are therefore left without the means of bestowing our efforts on the Western frontier; and the position of appearing to neglect so important a duty, in which this bureau has been placed, is shown by the foregoing remarks to have been beyond its power to obviate.

Should the organization proposed be adopted, it will leave the whole appropriation for surveys free from the deductions for the salaries now paid out of it, and the bureau may then place a brigade of officers on the Western frontiers, to commence the execution of those important duties. Should it not be adopted, it will be seen that the bureau will be as unable as heretofore to attend to them, unless a separate appropriation is granted, and which is asked, in order to meet the contingencies of the case, in the estimate now submitted.

The survey of the coast. It would be superfluous to speak of the

necessity of this survey, of its immense importance to our commerce and navy, and of its extensive influence over any system of defence for the Atlantic frontier.

Of the methods by which alone such a duty ever has been executed by any nation, or ever can be correctly, the books are full: and from the same sources we may also draw the best conclusions, of the time, and means, and qualifications which such a labor requires. Applications have been made to this bureau for aid in officers, but it has been unable to furnish but one. It was a cause of serious regret, but yet beyond the power of this bureau to remedy, and only in the hands of Congress by legislative action.

We have but one school in our country which may be considered as thoroughly mathematical in its course, the military school at West Point; and it is to this school only to which we can look for individuals sufficiently qualified to enter upon the duties of this survey, and justly aspire to a knowledge of its highest practical operations. I do not mean by this to say that there may not be citizens who, of their own taste and own force of mind, are not equally qualified; but these are only rare exceptions to a rule, the correctness of which will stand the proof of a comparison of the course of mathematical instruction and habits of study pursued at West Point, with those of any other school or college in our country.

Now, then, if the desire is, that this great work should not cease with the life of the present highly informed gentleman who superintends it, and that, in course of time, we should have numbers capable of conducting it, and of executing any of its parts, we must give them the opportunity of acquiring the necessary practical knowledge, by placing them upon it. This can be done only by allowing to the corps within whose proper province such duties naturally fall, the necessary numbers. We can then place upon this duty a brigade of officers, from whose efforts may be justly anticipated the results of adequate education, facilities in practice, and of order and subordination of conduct.

The superintendence of constructions purely civil. There is no corps in our country to which the duties of a corps of *ponts et chaussees* so properly belong as to the topographical engineers. It is so intimated in the report of the Military Committee of the last year; and it seems to me an unequivocal dictate of common sense to say, that the corps which is employed in making the survey, digesting the plan, and forming the estimate of a work, is, from the very nature of the case, more fully imbued than any other can be, with the considerations and unity of view which its construction involves, and, therefore, better qualified to superintend it. The subject does not seem to admit of much reasoning, but stands, like an axiom, upon the clear truth in its annunciation.

Having now exposed generally to your consideration the defects of the present organization of this bureau, its evils to the service, the remedy, and the general duties which the corps will be called upon to execute, I have in conclusion, appended to this report the form of a short bill, which appears to me best adapted to effect the desired organization.

Respectfully submitted.

JOHN J. ABERT,
Lieut. Col. Topographical Engineers.

A.

STATEMENT showing the amount of money drawn from the Treasury and remitted to the officers and agents disbursing under the Topographical Bureau, from the 1st October, 1834, to the 30th September, 1835, inclusive, and the amount of accounts rendered by each within the same period.

To whom remitted.	On what account.	Amount remitted.	Amount disbursed.
Lt. Col. J. Kearney, T. E.	Surveys for roads and canals under the act of the 30th April, 1824	$1,600 00	$2,918 05
Lt. Col. S. H. Long, do.	Do. do.	600 00	
Maj. J. D. Graham, do.	Do. do.	3,000 00	3,316 05
Capt. W. G. Williams, do.	Do. do.	500 00	871 48
Capt. A. Canfield, do.	Do. do.	700 00	633 00
Lt. J. M. Berrien, U. S. A.	Do. do.	1,850 00	238 93
Lt. A. J. Center, do.	Do. do.	1,400 00	1,491 40
Lt. W. M. Mather, do.	Do. do.	200 00	
G. W. Featherstonhaugh, geologist, - -	Do. do.	2,800 00	1,800 00
W. B. Guion, civil eng.	Do. do.	1,700 00	1,539 94
G. W. Hughes, do.	Do. do.	2,050 00	1,905 13
H. Stansbury, assist. do.	Do. do.	3,900 00	3,807 48
J. P. Bailey, do. do.	Do. do.	1,500 00	2,455 67
Major H. Bache, T. E.	Rebuilding the light-house on the Brandywine shoal in the bay of Delaware, under the act of 30th June, 1834 - -	1,550 00	1,117 66
Maj. W. G. McNeill, do.	Surveying a route for a road from the Alabama State line, through the town of Marianna, to Appalachicola, in Florida, under the act of 30th June, 1834 - -	3,000 00	2,844 72
Maj. W. G. McNeill, do.	Surveying east pass into Appalachicola bay, under the act of 30th June, 1834 -	500 00	658 48
	Dollars -	26,850 00	25,597 99

A BILL for the better organization of the Corps of Topographical Engineers.

SEC. 1. *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That the corps of topographical engineers shall be organized and increased by regular promotions in the same, so that the said corps shall consist of one colonel, one lieutenant colonel, four majors, ten captains, ten first lieutenants, and ten second lieutenants.

SEC. 2. *And be it further enacted*, That vacancies created by said organization, over and above those which can be filled by the present corps, shall be taken from the army, and from such as it may be deemed advisable, of the civil engineers employed under the act of the 30th April, 1824, and that the pay and emoluments to the officers of said corps shall be the same as are allowed to officers of similar rank in the regiment of dragoons.

SEC. 3. *And be it further enacted*, That the authority to employ civil engineers, in the act of the 30th April, 1824, and the authority by law for the employment of the present corps of topographical engineers be, and the same are hereby, repealed, after the passage of this act, and that all letters and packages on public business, to and from the chief of the corps now authorized, be free from postage.

SEC. 4. *And be it further enacted*, That the officers of said corps shall be subject to the rules and articles of war, and to such regulations in relation to their duties as the President may think proper to adopt.